

FORM PTO-1390 (Modified)
(REV 11-98)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

TRANSMITTAL LETTER TO THE UNITED STATES

112740-151

DESIGNATED/ELECTED OFFICE (DO/EO/US)

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR

CONCERNING A FILING UNDER 35 U.S.C. 371

09/806,122

INTERNATIONAL APPLICATION NO.

PCT/DE99/02926

INTERNATIONAL FILING DATE

15 September 1999

PRIORITY DATE CLAIMED

30 September 1998

TITLE OF INVENTION

METHOD FOR MODIFYING THE TRANSMISSION-ORIENTED VARIABLES OF A MONITORING
PROCEDURE

APPLICANT(S) FOR DO/EO/US

Herbert Heiss

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☐ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☒ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☐ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☐ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
 - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☐ A copy of the International Search Report (PCT/ISA/210).
8. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☐ have not been made and will not be made.
9. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
10. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
11. ☐ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).

Items 13 to 20 below concern document(s) or information included:

13. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☐ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☒ Certificate of Mailing by Express Mail
20. ☐ Other items or information:

07/16/2001 SNAJARRO 00000102 09806122

01 FC:154

130.00 DP

FORMPTO-1390(Modified) (REV 4-98)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTORNEY'S DOCKET NUMBER
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371			112740-151
			U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 09/806122)
INTERNATIONAL APPLICATION NO. PCT/DE99/02926	INTERNATIONAL FILING DATE 15 September 1999	PRIORITY DATE CLAIMED 30 September 1998	
TITLE OF INVENTION METHOD FOR MODIFYING THE TRANSMISSION-ORIENTED VARIABLES OF A MONITORING PROCEDURE			
APPLICANT(S) FOR DO/EO/US Herbert Heiss			
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:			
<ol style="list-style-type: none"> <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371. <input checked="" type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1). <input checked="" type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371 (c) (2)) <ol style="list-style-type: none"> <input checked="" type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau). <input type="checkbox"/> has been transmitted by the International Bureau. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US). <input checked="" type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)). <input checked="" type="checkbox"/> A copy of the International Search Report (PCT/ISA/210). <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3)) <ol style="list-style-type: none"> <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau). <input checked="" type="checkbox"/> have been transmitted by the International Bureau. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired. <input type="checkbox"/> have not been made and will not be made. <input checked="" type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)). <input type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)). <input checked="" type="checkbox"/> A copy of the International Preliminary Examination Report (PCT/IPEA/409). <input type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)). 			
Items 13 to 20 below concern document(s) or information included:			
<ol style="list-style-type: none"> <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98. <input checked="" type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included. <input checked="" type="checkbox"/> A FIRST preliminary amendment. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment. <input type="checkbox"/> A substitute specification. <input type="checkbox"/> A change of power of attorney and/or address letter. <input checked="" type="checkbox"/> Certificate of Mailing by Express Mail <input checked="" type="checkbox"/> Other items or information: 			
Submission of Drawings - Figures 1-3 on two sheets			

U.S. APPLICATION NO. (IF KNOWN) SEE 37 CFR 09/806122	INTERNATIONAL APPLICATION NO. PCT/DE99/02926	ATTORNEY'S DOCKET NUMBER 112740-151
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21. The following fees are submitted:

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :

- ☐ Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO **\$1,000.00**
- ☒ International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO **\$860.00**
- ☐ International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO **\$710.00**
- ☐ International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) **\$690.00**
- ☐ International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) **\$100.00**

ENTER APPROPRIATE BASIC FEE AMOUNT =**\$860.00**

Surcharge of **\$130.00** for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).

\$0.00

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE
Total claims	7 - 20 =	0	x \$18.00
Independent claims	1 - 3 =	0	x \$80.00

\$0.00**\$0.00**Multiple Dependent Claims (check if applicable) . ☐**\$0.00****TOTAL OF ABOVE CALCULATIONS =****\$860.00**

Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28) (check if applicable) . ☐

\$0.00**SUBTOTAL =****\$860.00**

Processing fee of **\$130.00** for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (f)).

\$0.00**TOTAL NATIONAL FEE =****\$860.00**

Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable). ☐

\$0.00**TOTAL FEES ENCLOSED =****\$860.00**

Amount to be:	\$
refunded	
charged	\$

☒ A check in the amount of **\$860.00** to cover the above fees is enclosed.

☐ Please charge my Deposit Account No. _____ in the amount of _____ to cover the above fees.
A duplicate copy of this sheet is enclosed.

☒ The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. **02-1818** A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

William E. Vaughan
Bell, Boyd & Lloyd LLC
P.O. Box 1135
Chicago, IL 60690-1135

SIGNATURE

William E. Vaughan

NAME

39,056

REGISTRATION NUMBER

March 28, 2001

DATE

09/806122

JC08 Rec'd PCT/PTO 28 MAR 2001
BOX PCT

IN THE UNITED STATES ELECTED OFFICE
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY-CHAPTER II

PRELIMINARY AMENDMENT

APPLICANT: Herbert Heiss

ATTORNEY DOCKET NO.: 112740-151

SERIAL NO.:

INTERNATIONAL APPLICATION NO: PCT/DE99/02926

INTERNATIONAL FILING DATE: 15 September 1999

INVENTION: METHOD FOR MODIFYING THE TRANSMISSION-ORIENTED
VARIABLES OF A MONITORING PROCEDURE

Assistant Commissioner
Patent and Trademark Office
Washington, D.C. 20231

S I R:

Please amend the above-identified International Application before entry into the National stage before the U.S. Patent and Trademark Office under 35 U.S.C. § 371 as follows:

In The Specification:

On amended page 1, cancel lines 1-4, and substitute therefor

--S P E C I F I C A T I O N

TITLE

**METHOD FOR MODIFYING THE TRANSMISSION-ORIENTED
VARIABLES OF A MONITORING PROCEDURE**

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a method for modifying the transmission-oriented variables of a monitoring procedure which improves the monitoring of predetermined variable transmission rates of ATM cells of virtual connections of an ATM communication facility.

Description of the Prior Art--

On amended page 1, line 13, cancel the “-“ and substitute therefor a --;--.

On amended page 1, line 16, cancel “Said” and substitute therefor --Such--.

On amended page 23, cancel “This means that” and substitute therefor --As such,--.

On amended page 1a, line 1, cancel the “-“ and substitute therefor a --,--.

On amended page 1a, line 2, cancel the “-“ and substitute therefor a --,--.

On amended page 2, line 13, cancel “said” and substitute therefor --this--.

On amended page 2, line 28, cancel “by means of” and substitute therefor --via--.

On amended page 2a, line 12, cancel “The” and substitute therefor --An--.

On amended page 2a, line 12, cancel “forming the basis”.

On amended page 2a, line 12, insert --present-- before “invention”.

On amended page 2a, lines 15-16, cancel “The object is achieved by the features of patent claim 1.”

On amended page 2a, after line 16, insert the following:

--SUMMARY OF THE INVENTION

Accordingly, pursuant to the method according to the present invention, on arrival of an ATM cell for a virtual connection, a theoretical arrival time determined with the aid of a monitoring time derived from the transmission rate is determined for monitoring the next ATM cell with the aid of a monitoring procedure, both the theoretical arrival time and the monitoring time being temporarily stored in a memory unit until they are updated. After a current monitoring time has been derived from the current transmission rate in the period--

On page 3, line 11, insert --present-- before “invention”.

On page 3, line 23, insert --present-- before “invention”.

On page 3, lines 26-27, cancel “according to the invention”.

On page 3, line 32, cancel “according to” and substitute therefor --of--.

On page 3, line 32, insert --present-- before “invention”.

On page 3, line 33, cancel the “-“ and substitute therefor a --,--.

On page 3, line 34, cancel the “-“ and substitute therefor a --,--.

On page 3, line 36, insert a --,-- after “for”.

On page 3, line 36, insert a --,-- after “case”.

On page 3, line 38, cancel “This means that” and substitute therefor --As such,--.

On page 3a, line 2, insert --present-- before “invention”.

On page 4, line 2, insert --present-- before “invention”.

On page 4, line 9-10, cancel “-claim 2”.

On page 6, line 26, cancel the “-“ and substitute therefor a --,--.

On page 6, line 27, cancel the “-“ and substitute therefor a --,--.

On page 6, line 28, cancel “figure” and substitute therefor --Figure--.

On page 7, line 3, insert a --,-- after “of”.

On page 7, line 3, insert --for-- before “example”.

On page 7, line 3, insert a --,-- after “example”.

On page 7, line 3, cancel “for”.

On page 7, line 4, cancel “figure” and substitute therefor --Figure--.

On page 7, line 4, cancel “single-“ and substitute therefor --single-stage--.

On page 7, line 5, cancel “can”.

On page 7, line 5, insert --can-- after “also”.

On page 7, line 12, insert --present-- before “invention”.

On page 7, line 14, insert a --,-- after “shows”.

On page 7, line 14, insert a --,-- after “example”.

On page 7, line 23, insert --present-- before “invention”.

On page 7, line 23, cancel “figure” and substitute therefor --Figure--.

On page 7, line 38, cancel “figure” and substitute therefor --Figure--.

On page 8, line 13, cancel the “-“ and substitute therefor a “,”.

On page 8, line 14, cancel the “-“ and substitute therefor a “,”.

On page 8a, line 1, cancel the “-“ and substitute therefor a “,”.

On page 8a, line 1, cancel the “-“ and substitute therefor a “,”.

On page 9, line 4, insert --present-- before “invention”.

On page 9, line 6, cancel “,” and substitute therefor a “,”.

On page 9, line 7, insert a --,-- after “example”.

On page 9, line 9, cancel “according to” and substitute therefor --of--.

On page 9, line 10, insert --present-- before “invention”.

On page 9, line 11, cancel “figure” and substitute therefor --Figure--.

On page 9, line 31, cancel the “-“ and substitute therefor a --,--.

On page 9, line 33, cancel the “-“ and substitute therefor a --,--.

On page 10, line 32, insert --present-- before “invention”.

On page 11, after line 10, insert the following paragraph:

--Although the present invention has been described with reference to specific embodiments, those of skill in the art will recognize that changes may be thereto without

departing from the spirit and scope of the invention as set forth in the hereafter appended claims.--

On page 15 (last page), cancel all lines of text and substitute the following therefor:

--ABSTRACT OF THE DISCLOSURE

A method for modifying the transmission-oriented variables of a monitoring procedure wherein, in the case of variable transmission rates of ATM cells of virtual connections within an ATM communication facility, a theoretical arrival time, determined with the aid of a monitoring time derived from the transmission rate, is determined for monitoring the next ATM cell with the aid of the monitoring procedure on arrival of an ATM cell for a virtual connection and, if there is a change in the transmission rate, the theoretical arrival time is corrected by the monitoring time.--

In the Claims

On page 12, cancel line 1 and substitute the following left-hand justified heading therefor:

--I Claim as My Invention--

Please cancel claims 1-7, without prejudice, and substitute the following claims therefor:

8. A method for modifying transmission-oriented variables of a monitoring procedure of predetermined variable transmission rates of ATM cells of virtual connections of an ATM communication facility, the method comprising the steps of:

receiving at the communication facility an ATM cell for a virtual connection;

deriving a first monitoring time from a first transmission rate of the ATM cells;

determining a theoretical arrival time for a next ATM cell using the first monitoring time;

storing, temporarily, both the theoretical arrival time and the first monitoring time in a memory unit until further updating;

deriving a current monitoring time from a current transmission rate of the ATM cells, wherein the current monitoring time is subsequent to the first monitoring time and before a further determination of the theoretical arrival time of the next ATM cell;

determining if the current transmission rate has changed from the first transmission rate;

correcting the theoretical arrival time, if the current transmission rate is greater than the first transmission rate, using the monitoring time, and calculating a current value of the theoretical arrival time using the current monitoring time.

9. A method for modifying transmission-oriented variables of a monitoring procedure of predetermined variable transmission rates of ATM cells of virtual connections of an ATM communication facility as claimed in claim 8, wherein the theoretical arrival time is determined by adding the monitoring time last derived to the theoretical arrival time last calculated, and wherein, if there is an increase in the transmission rate of the ATM cells, the temporarily stored monitoring time is subtracted from the temporarily stored theoretical arrival time and the current monitoring time is added.

10. A method for modifying transmission-oriented variables of a monitoring procedure of predetermined variable transmission rates of ATM cells of virtual connections of an ATM communication facility as claims in claim 8, wherein the theoretical arrival time is determined by subtracting the monitoring time last derived from the theoretical arriving time last calculated, and wherein, if there is an increase in the transmission rate of the ATM cells, the temporarily stored monitoring time is added to the temporarily stored theoretical arriving time and the current monitoring time is subtracted.

11. A method for modifying transmission-oriented variables of a monitoring procedure of predetermined variable transmission rates of ATM cells of virtual connections of an ATM communication facility as claimed in claim 8, wherein the monitoring time is indirectly proportional to the transmission rate of the ATM cells, the proportionality being generated using a proportionality constant having a same magnitude for all the virtual connections.

12. A method for modifying transmission-oriented variables of a monitoring procedure of predetermined variable transmission rates of ATM cells of virtual connections of an ATM communication facility as claimed in claim 8, the method further comprising the step of:

detecting a change in the transmission rate of the ATM cells by comparing the monitoring cells of the monitoring time last derived with the current monitoring time.

13. A method for modifying transmission-oriented variables of a monitoring procedure of predetermined variable transmission rates of ATM cells of virtual connections of an ATM communication facility as claimed in claim 8, wherein, after calculating the current value of the theoretical arrival time using the current monitoring time, the first monitoring time is replaced by the current monitoring time and temporarily stored.

14. A method for modifying transmission-oriented variables of a monitoring procedure of predetermined variable transmission rates of ATM cells of virtual connections of an ATM communication facility as claimed in claim 8, wherein, the theoretical arrival time and the first monitoring time are determined using counters, wherein the theoretical arrival time, the current monitoring time and the first monitoring time are determined by individual counts, and wherein the counts representing the theoretical arrival time and the first monitoring time are temporarily stored in a memory unit.

REMARKS

The present amendment makes editorial changes and corrects typographical errors in the specification in order to conform the specification to the requirements of the United States Patent practice. No new matter is added thereby. Original claims 1-7 has been canceled in favor of new claims 8-14. Claims 8-14 have been presented solely because the revisions by bracketing and underlining which would have been necessary in claims 1-7 in order to present the claim in accordance with preferred United States Patent practice would have been too extensive, and thus would have been too burdensome. The amendment is intended for clarification purposes only and not for substantial reasons related to patentability pursuant to 35 U.S.C. §§101, 102, 103 or 112. Indeed, the cancellation of claims 1-7 does not constitute an intent on the part of the Applicant to surrender any of the subject matter of claims 1-7.

Early consideration on the merits is respectfully requested.

Respectfully submitted,



(Reg. No. 39,056)

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09/806122

JC08 Rec'd PCT/PTO 28 MAR 2001

BOX PCT

IN THE UNITED STATES ELECTED/DESIGNATED OFFICE
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY-CHAPTER II

5

APPLICANT: Herbert Heiss DOCKET NO: 112740-151

SERIAL NO: GROUP ART UNIT:

EXAMINER:

10 INTERNATIONAL APPLICATION NO: PCT/DE99/02926

INTERNATIONAL FILING DATE: 15 September 1999

INVENTION: METHOD FOR MODIFYING THE TRANSMISSION-
ORIENTED VARIABLES OF A MONITORING
PROCEDURE

15

Assistant Commissioner for Patents,
Washington, D.C. 20231

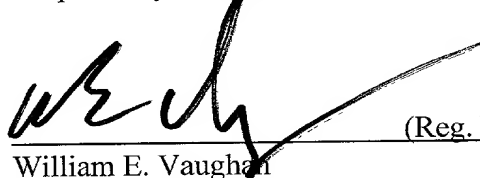
SUBMISSION OF DRAWINGS

20

Applicant herewith submits two sheets (Figs. 1-3) of drawings for the
above-referenced PCT application.

Respectfully submitted,

25



(Reg. No. 39,056)

William E. Vaughan

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Attorneys for Applicant

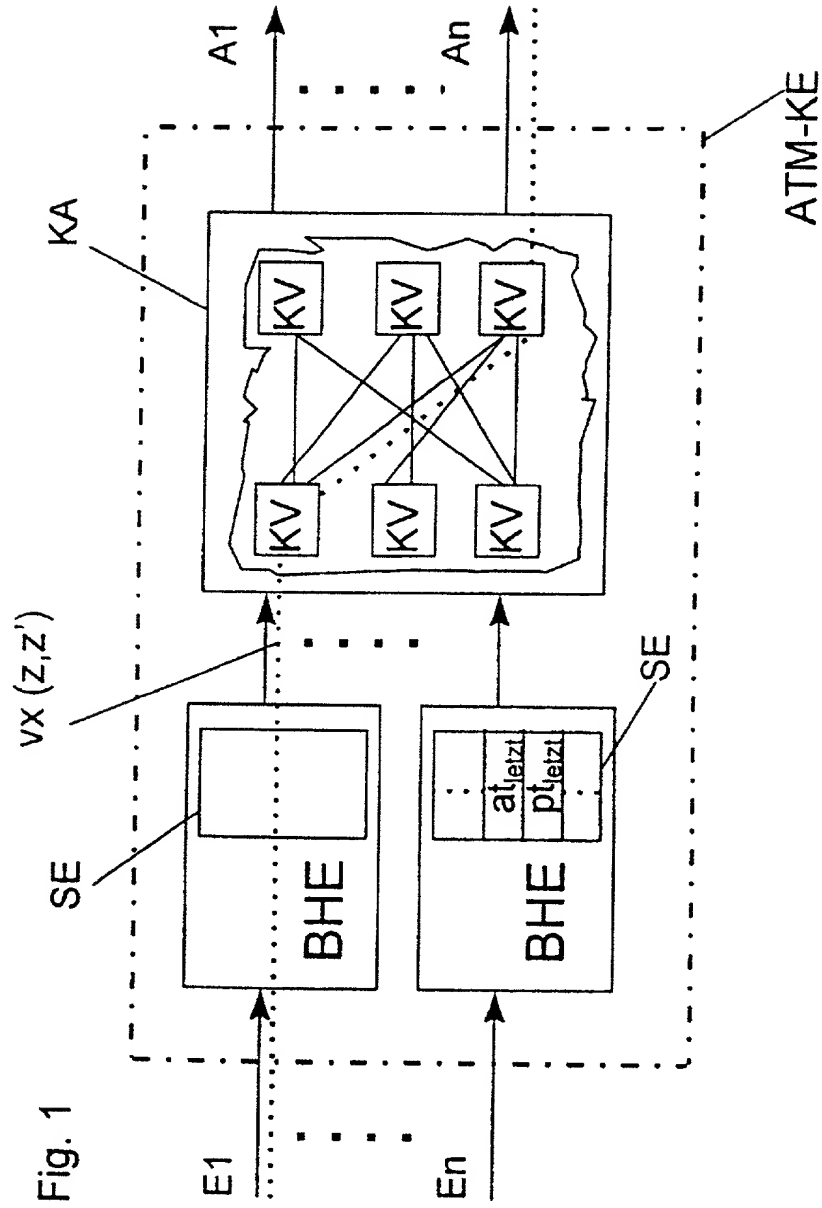


Fig. 1

Fig. 2

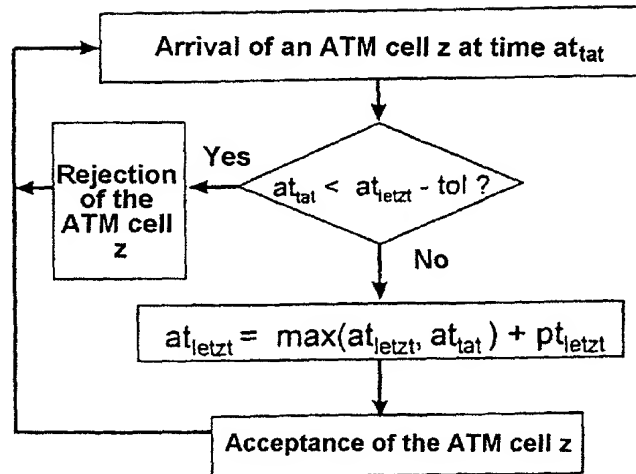
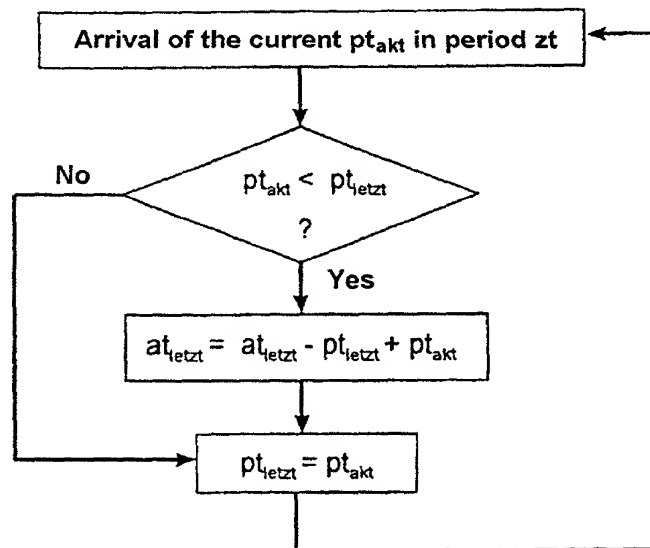


Fig. 3



GR 98 P 2855

Description

Method for modifying the transmission-oriented variables of a monitoring procedure.

5 In existing and future packet-oriented communication systems, especially in ATM communication systems operating in accordance with the asynchronous transfer mode, individual monitoring procedures such as the "virtual scheduling algorithm" or the "continuous-state leaky bucket algorithm" or other problem-solving
10 methods are used for monitoring established transmission rates of ATM cells of virtual connections within an ATM communication network - see, for example, EP 720 411 A2 and ITU-T I.371 "Traffic control and congestion control in B-ISDN", pp. 61-63, August 1996
15 in this respect. Said monitoring procedures or monitoring methods can be used for detecting overload situations in an ATM communication facility and then to initiate measures for eliminating such overload
20 scenarios.

Information is increasingly transmitted via virtual connections with variable transmission bit rates. This means that the ATM cells are also transmitted at variable transmission rates. The
25 variable transmission rates of ATM cells over virtual connections make new demands on the monitoring procedures, the adaptation to variable transmission rates within the monitoring procedure, in particular, representing a problem. To this end, a monitoring
30 procedure which adapts itself to the variable transmission rate has been proposed in ITUI standard I.371.1 "Traffic control and congestion control in B-ISDN: conformance definitions for ABT and ABR", p. 15-16, June 1997. In this monitoring procedure the
35 adaptation of the last theoretical arrival time of an ATM cell - called "last virtual scheduling time" in the ITU-T standard - to the current transmission rate with the aid of a

transmission-oriented monitoring time which is added to the last theoretical arrival time is provided after the arrival of an ATM cell, this adaptation being performed before the actual arrival time of the ATM cell is checked for conformance with the transmission rate. In this arrangement, the theoretical arrival time currently determined is already matched to the current transmission rate of the ATM cell. After the check, the last theoretical arrival time is associated with the current arrival time of an ATM cell or the currently determined theoretical arrival time, depending on which of the two times has the later time information. In said method, it is required to temporarily store three transmission-rate-oriented variables per virtual connection for implementing the monitoring procedure within an ATM communication facility, this being associated with a considerable expenditure of memory capacity, especially with regard to the high numbers of virtual connections within ATM communication networks, and with an increased dynamic load on the ATM communication facility due to the reading and writing of the transmission-oriented variables.

The object forming the basis of the invention consists in improving the monitoring of predetermined variable transmission rates of ATM cells of virtual connections of an ATM communication facility. The object is achieved by the features of patent claim 1.

The essential aspect of the method according to the invention can be seen in the fact that, on arrival of an ATM cell for a virtual connection, a theoretical arrival time determined with the aid of a monitoring time derived from the transmission rate is determined for monitoring the next ATM cell with the aid of a monitoring procedure, both the theoretical arrival time and the monitoring time being temporarily stored in a memory unit until they are updated. After a current monitoring time (pt_{akt}) has been derived from the current transmission rate in the period

after the determination of the theoretical arrival time and before the subsequent determination of the theoretical arrival time of the next ATM cell of a virtual connection, a check is made whether the transmission rate of the virtual connection has been changed and, if the transmission rate is increased, the theoretical arrival time is corrected with the aid of the monitoring time. After that, a current theoretical arrival time is calculated with the aid of the current monitoring time. An essential advantage of the method according to the invention can be seen in the fact that the transmission-oriented variables of a monitoring procedure can be modified independently of the processing by the monitoring procedure and thus the transmission-oriented variables of the monitoring procedure are already adapted to the changed transmission rate before the next ATM cell arrives. In this arrangement, the modification of the transmission-oriented variables is decoupled from the monitoring procedure and the modification can be performed at a time with lower dynamic loading on the ATM communication system. A further essential advantage of the method according to the invention can be seen in the fact that, due to the decoupling of the modification of the transmission-oriented variables from the monitoring procedure, the method according to the invention can be used approximately simultaneously for a number of monitoring procedures for established transmission rates of ATM cells, and the monitoring procedures previously used can still be used unmodified. Furthermore, according to the method according to the invention, two transmission-oriented variables - the theoretical arrival time and a monitoring time - are temporarily stored for each individual connection, which leads to a reduction in the memory capacity needed for in each case one virtual connection in comparison to the method proposed in ITU-T I.371.1. This means that considerably more virtual

connections can be monitored by the method according to the invention with the same memory volume.

According to a further embodiment of the method according to the invention, during the determination of the theoretical arrival time, the monitoring time last derived from the transmission rate is added to the theoretical arrival time last calculated. After that, if there is a change in the transmission rate, the temporarily stored monitoring time is subtracted from the temporarily stored theoretical arrival time last calculated and the current monitoring time is added - claim 2. This addition of the monitoring time last derived from the transmission rate to the theoretical arrival time last calculated is in agreement with ITU-I standard I.371.1.

According to a further advantageous embodiment of the method according to the invention, during the determination of the theoretical arrival time, the monitoring time last derived from the transmission rate is subtracted from the theoretical arrival time last calculated. After that, if there is a change in the transmission rate, the temporarily stored monitoring time is added to the temporarily stored theoretical arrival time last calculated and the current monitoring time is subtracted - claim 3. This subtraction of the monitoring time last derived from the transmission rate from the theoretical arrival time last calculated is in agreement with one of the "methods and system for monitoring an ATM cell stream" disclosed in EP 720 411 A2.

The monitoring time is advantageously derived from the transmission rate of the ATM cells of virtual connections, the monitoring time being indirectly proportional to the transmission rate of the ATM cells and the proportionality being generated with the aid of a proportionality constant which is of the same magnitude for all the virtual connections of a circuit - claim 4. The determination of the monitoring time is in agreement with ITU-I standards I.371 and I.371.1.

According to a further advantageous embodiment of the method according to the invention, the theoretical arrival time representing the transmission-oriented variables of a monitoring procedure and the monitoring time are determined with the aid of counters, the theoretical arrival time, the current monitoring time and the monitoring time last derived from the transmission rate being determined by individual counts and the counts representing the theoretical arrival time and the monitoring time last derived from the transmission rate being temporarily stored in a memory unit - claim 7. By implementing the determination of the theoretical arrival time, the current monitoring time and the monitoring time last derived from the transmission rate with the aid of counters, the transmission-oriented variables representing timing information are mapped to currents and can thus be processed further in a simple manner by microprocessors. When using counters, the method according to the invention can be implemented by simple circuit or programming techniques. For the "method for monitoring an ATM cell stream" described in EP 720 411 A2, too, connection-associated counts are provided in order to be able to detect a transgression of the transmission rate established for the respective connection, i.e. constant transmission rate of ATM cells. The method according to the invention can thus also be used as an especially advantageous supplement for predetermined variable transmission rates of ATM cells in the method described in EP 720 411 A2.

Further advantageous embodiments of the method according to the invention can be found in the further claims.

In the text which follows, the method according to the invention will be explained in greater detail with reference to a block diagram and two flow charts.

Figure 1 shows an ATM communication facility suitable for implementing the method according to the invention in a block diagram,

Figure 1 shows an ATM communication facility suitable for implementing the method according to the invention in a block diagram,

Figure 2 shows a known monitoring procedure in a flow chart, and

5 Figure 3 shows the method according to the invention in a flow chart.

The block diagram of figure 1 diagrammatically shows an ATM communication facility ATM-KE operating in accordance with the asynchronous transfer mode, to which a multiplicity of offering trunks E1 to En and a multiplicity of serving trunks A1 to An are connected. Of these, the offering trunks E1 to En and the serving trunks A1 to An are shown by way of example in figure 1. ATM cells are transmitted via the offering trunks E1 to En and the serving trunks A1 to An via virtual connections in accordance with the asynchronous transfer mode, variable transmission rates being provided for the transmission of the ATM cells of virtual connections. A virtual connection vx is shown by way of example by a dotted line in figure 1.

As is shown in figure 1, each of the offering trunks E1 to En is in each case associated with a handling facility BHE. Such a handling facility contains, among other things, a memory unit SE in which the connection-associated transmission-oriented variables - a last theoretical arrival time $at_{1etz t}$ and a last monitoring time $pt_{1etz t}$ - are temporarily stored, figure 1 only showing the temporarily stored transmission-oriented variables $at_{1etz t}$ and $pt_{1etz t}$ of a virtual connection vx in a handling facility BHE. The handling facility BHE is supplied with the ATM cells transmitted in virtual connections. In addition, the handling facility BHE carries out a connection-associated monitoring of the current variable transmission rates of the ATM cells of virtual connections with the aid of the transmission-oriented variables. The ATM cells of a virtual connection vx are

then forwarded to a switching arrangement KA of the ATM communication facility ATM-KE, a multi-

stage structure having a multiplicity of switching matrices KV connected to one another being specified by way of example for the switching arrangement KA in figure 1. However, any type of single- or multi-stage switching arrangements can also be used. Following this, the ATM cells z of a virtual connection vx are forwarded in a connection-associated manner to the serving trunks A1 to An by the switching arrangement KA. The operation of the monitoring procedure implemented within the handling facility BHE and how this is adapted by the method according to the invention will be discussed in greater detail in the text which follows.

Figure 2 shows by way of example the flow chart of the "virtual scheduling algorithm" method for monitoring established transmission rates of ATM cells, proposed in ITU-T I.371 "Traffic control and congestion control in B-ISDN". In the exemplary embodiment, the "virtual scheduling algorithm" monitoring procedure is deliberately selected as a representative of the type of "generic cell rate algorithm" monitoring procedures for explaining the operation of the method according to the invention. Referring to figure 1, the transmission-oriented variables generated in a connection-associated manner are stored in the memory areas of the memory unit SE of the handling facility BHE which are associated with the individual virtual connections. These transmission-oriented variables are the last arrival time at_{letzt} and the last monitoring time pt_{letzt} , the last theoretical arrival time at_{letzt} of an ATM cell z of a virtual connection vx being the theoretical arrival time at_{letzt} determined last by the monitoring procedure for the incoming ATM cell z, assuming an established transmission rate of a virtual connection vx. The designation last monitoring time pt_{letzt} , in contrast, is a value of the virtual connection vx which is indirectly proportional to the transmission rate last established. According to figure 2, the monitoring procedure

is activated at the actual arrival time at_{tat} on arrival of an ATM cell z and the actual arrival time at_{tat} is temporarily stored in a buffer memory of the memory unit SE. After that, the last theoretical arrival time at_{letzt} is read out of the memory unit SE with the aid of a read cycle and reduced by a connection-associated and transmission-rate-oriented tolerance time tol , the tolerance time tol predefining a range of tolerance time for the acceptance of an ATM cell. If the value of the actual arrival time at_{tat} is greater than the value of the last theoretical arrival time at_{letzt} reduced by the tolerance time tol , the time information exhibiting the greater value - the last theoretical arrival time at_{letzt} or, respectively, the actual arrival time at_{tat} - is then determined and the monitoring time pt_{letzt} last calculated and read out of the memory unit SE is added to this. This newly determined value represents the calculated theoretical arrival time at_{letzt} for the next ATM cell z . The current ATM cell z is accepted and the monitoring procedure is deactivated. If the value of the actual arrival time at_{tat} is smaller than the value of the last theoretical arrival time at_{letzt} reduced by the tolerance time tol , the ATM cell z is rejected and the monitoring procedure is deactivated. When an ATM cell is rejected, the last theoretical arrival time at_{letzt} and the monitoring time pt_{letzt} read out are temporarily stored unchanged in a connection-associated manner in the memory unit SE during a write cycle and if not, the adapted last theoretical arrival time at_{letzt} and the last monitoring time pt_{letzt} are temporarily stored.

On arrival of an ATM cell z of a virtual connection vx with a changed transmission rate, the change in transmission rate of the ATM cell z of a virtual connection vx must be taken into consideration in the calculation of the theoretical arrival time. This can be done either by using a new monitoring

procedure - see ITU-T standard I.371.1 - or by
modifying the transmission-oriented

variables. In contrast to the method proposed in ITU-T standard I.371.1, an additional procedure for modifying the transmission-oriented variables is provided in the method according to the invention, where it is possible
5 to perform this procedure between the last monitoring procedure and the current monitoring procedure, for example at a time with low dynamic loading.

The procedure for modifying the transmission-oriented variables according to the method according to
10 the invention will be explained in greater detail with the aid of the flow chart in figure 3 in the text which follows. After the monitoring time pt_{akt} has been derived from the current transmission rate of the ATM cells in a modification period zt , the procedure is
15 activated, the modification period zt representing the period between the processing of the last monitoring procedure and the processing of the current monitoring procedure. After the monitoring time pt_{letzt} determined last from the transmission rate of the ATM cells of the
20 virtual connections and temporarily stored in the memory unit SE has been read out, the monitoring time pt_{akt} currently determined from the changed transmission rate of the ATM cells is compared with the monitoring time pt_{letzt} last determined from the transmission rate
25 of the ATM cells of the virtual connections. If the monitoring time pt_{letzt} last determined from the transmission rate of the ATM cells of the virtual connections is later in time in comparison with the time information of the monitoring time pt_{akt} currently
30 determined from the changed transmission rate of the ATM cells - which corresponds to an increase in the transmission rate of the ATM cells of a virtual connection vx - the last theoretical arrival time at_{letzt} is corrected as follows. The last theoretical arrival
35 time at_{letzt} is read out of the memory unit SE in a connection-associated manner. The last theoretical arrival time at_{letzt} is then reduced by the value of the monitoring time pt_{letzt} last determined from the

transmission rate of the ATM cells of the virtual connections and the value of the monitoring time pt_{akt} currently determined

from the changed transmission rate of the ATM cells is added. The value of the monitoring time pt_{akt} currently determined from the changed transmission rate of the ATM cells is then associated with the value of the monitoring time pt_{letzt} last determined from the transmission rate of the ATM cells of the virtual connections and temporarily stored in the buffer memory of the memory unit SE. If the monitoring time pt_{letzt} last determined from the transmission rate of the ATM cells of the virtual connection vx is earlier in time in comparison with the monitoring time pt_{akt} currently determined from the changed transmission rate of the ATM cells, the value of the monitoring time pt_{akt} currently determined from the changed transmission rate of the ATM cells is associated with the value of the monitoring time pt_{letzt} last determined from the transmission rate of the ATM cells of the virtual connection vx, and temporarily stored in the buffer memory of the memory unit SE. This concludes the adaptation of the transmission-oriented variables to the changed transmission rate of the ATM cell z of a virtual connection vx. Following this, the procedure for modifying the transmission-oriented variables is deactivated in both cases. When a next ATM cell z' arrives, the monitoring procedure then has available transmission-oriented variables which are already adapted to the changed transmission rate of the ATM cells. This provides for interference-free and resources-preserving monitoring of predetermined variable transmission rates of ATM cells in virtual connections.

The method according to the invention explained by the exemplary embodiment is not restricted to the "virtual scheduling algorithm" monitoring procedure as representative of the type of "generic cell rate algorithm" monitoring procedures but can be applied to other monitoring procedures of this form, especially the method known from EP 720 411 A2, where it is

possible to adapt the correction of the transmission-oriented variables in a

method-oriented manner by way of the procedure for modifying the transmission-oriented variables. By this is meant, in particular, the adding or, respectively, subtracting of monitoring times pt_{akt} , pt_{letzt} currently or last derived from the transmission rate to or, respectively, from the last theoretical arrival time at_{letzt} of the ATM cell, the monitoring times pt_{akt} , pt_{letzt} currently or last derived from the transmission rate and the last theoretical arrival time at_{letzt} of the ATM cell being determined with the aid of counters.

Patent claims

1. A method for modifying the transmission-oriented variables (at_{1etzt} , pt_{1etzt}) of a monitoring
5 procedure of predetermined variable transmission rates of ATM cells of virtual connections of an ATM communication facility (ATM-KE),

- in which, on arrival of an ATM cell (z) for a virtual connection (vx), a theoretical arrival
10 time (at_{1etzt}), determined with the aid of a monitoring time (pt_{1etzt}) derived from the transmission rate, being determined for monitoring the next ATM cell (z') with the aid of the monitoring procedure, both the theoretical arrival
15 time (at_{1etzt}) and the monitoring time (pt_{1etzt}) being temporarily stored in a memory unit (SE) until they are updated,

- in which, after a current monitoring time (pt_{akt}) has been derived from a current transmission rate,
20 in the period (zt) after the determination of the theoretical arrival time (at_{1etzt}) and before the subsequent determination of the theoretical arrival time (at_{1etzt}) of the next ATM cell (z') of a virtual connection (vx), a check is made whether
25 the transmission rate of the ATM cells of the virtual connection (vx) has been changed,

- in which, if the transmission rate is increased, the theoretical arrival time (at_{1etzt}) is corrected
30 with the aid of the monitoring time (pt_{1etzt}) and a current theoretical arrival time (at_{1etzt}) is calculated with the aid of the current monitoring time (pt_{akt}).

2. The method as claimed in claim 1, characterized
35 in that during the determination of the theoretical arrival time (at_{1etzt}), the monitoring time (pt_{1etzt}) last derived from the transmission rate is added to the theoretical arrival time (at_{1etzt}) last calculated, and

that, if there is an increase in the transmission rate,
the temporarily stored monitoring time (pt_{1etzt}) is
subtracted

from the temporarily stored theoretical arrival time ($at_{1etz t}$) last calculated and the current monitoring time (pt_{akt}) is added.

3. The method as claimed in claim 1, characterized in that during the determination of the theoretical arrival time ($at_{1etz t}$), the monitoring time ($pt_{1etz t}$) last derived from the transmission rate is subtracted from the theoretical arrival time ($at_{1etz t}$) last calculated, and that, if there is an increase in the transmission rate, the temporarily stored monitoring time ($pt_{1etz t}$) is added to the temporarily stored theoretical arrival time ($at_{1etz t}$) last calculated and the current monitoring time (pt_{akt}) is subtracted.

4. The method as claimed in one of claims 1 to 3, characterized in that the monitoring time (pt_{akt} , $pt_{1etz t}$) is derived from the transmission rate of the ATM cells of virtual connections, the monitoring time (pt_{akt} , $pt_{1etz t}$) being indirectly proportional to the transmission rate of the ATM cells and the proportionality being generated with the aid of a proportionality constant which is of the same magnitude for all the virtual connections of a circuit.

5. The method as claimed in one of claims 1 to 4, characterized in that a change in transmission rate of the ATM cells is detected by comparing the monitoring time ($pt_{1etz t}$) last derived from the transmission rate and the current monitoring time (pt_{akt}).

6. The method as claimed in one of claims 1 to 5, characterized in that after the theoretical arrival time ($at_{1etz t}$) has been adapted to the changed transmission rate of the virtual connection (vx), the monitoring time ($pt_{1etz t}$) last derived from the transmission rate is

replaced by the current monitoring time (pt_{akt}) and temporarily stored.

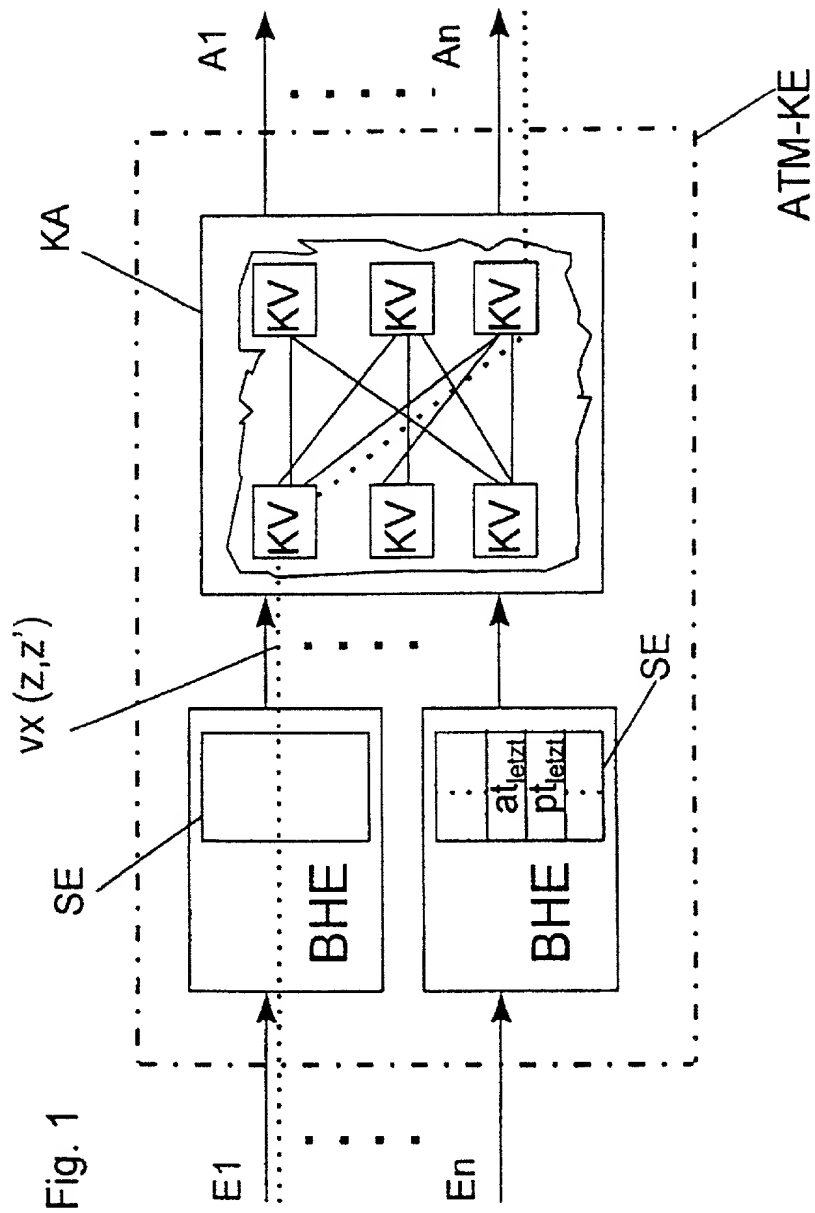
7. The method as claimed in one of claims 1 to 6, characterized in that the theoretical arrival time (at_{letzt}) representing the transmission-oriented variables of a monitoring procedure and monitoring time (pt_{letzt}) are determined with the aid of counters, the theoretical arrival time (at_{letzt}), the current monitoring time and the monitoring time (pt_{akt} , pt_{letzt}) last derived from the transmission rate being determined by individual counts and the counts representing the theoretical arrival time (at_{letzt}) and the monitoring time (pt_{letzt}) last derived from the transmission rate being temporarily stored in a memory unit (SE).

Abstract

Method for modifying the transmission-oriented variables of a monitoring procedure

In the case of variable transmission rates of ATM cells of virtual connections within an ATM communication facility (ATM-KE), a theoretical arrival time (at_{1etzt}), determined with the aid of a monitoring time (pt_{1etzt}) derived from the transmission rate, is determined for monitoring the next ATM cell (z') with the aid of the monitoring procedure on arrival of an ATM cell (z) for a virtual connection (vx) and, if there is a change in the transmission rate, the theoretical arrival time (at_{1etzt}) is corrected by the monitoring time (pt_{akt}).

Figure 3



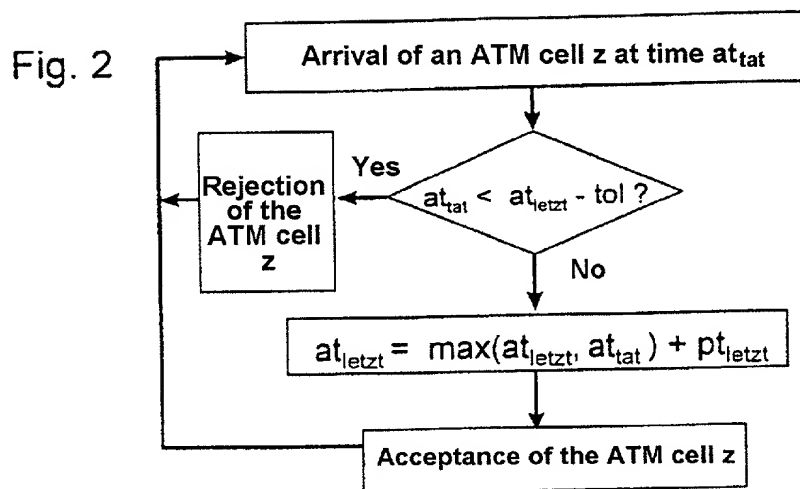
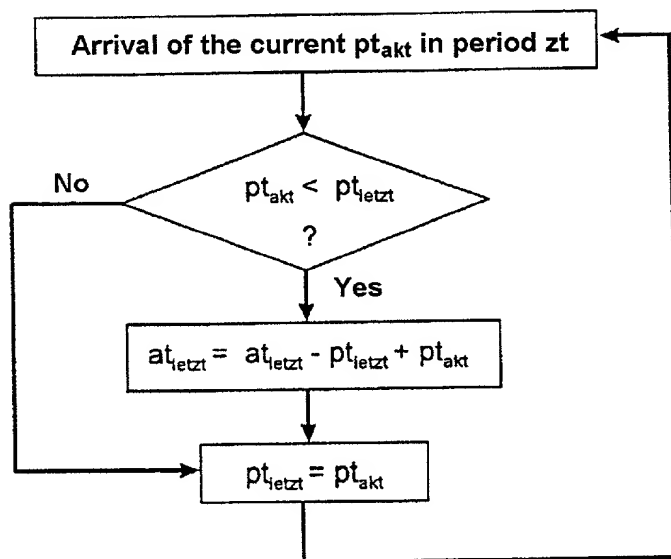


Fig. 3



COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY

(Includes Reference to PCT International Applications) PCT/DE99/02926

ATTORNEY'S
DOCKET NUMBER
112740-151

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name, I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

METHOD FOR MODIFYING THE TRANSMISSION-ORIENTED VARIABLES OF A MONITORING PROCEDURE

the specification of which (check only one item below):

☐ is attached hereto.☒ was filed as United States application
Serial No. 09/806,122on March 28, 2001

and was amended

on _____ (if applicable).

☐ was filed as PCT international application

Number _____

on _____

and was amended under PCT Article 19

on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:

PRIOR FOREIGN/PCT APPLICATION(S) AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. 119:

COUNTRY (if PCT indicate "PCT")	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 35 USC 119
Germany	198 44 993,3	30 September 1998	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO

Combined Declaration For Patent Application and Power of Attorney (Continued) (Includes Reference to PCT International Applications) PCT/DE99/02926				ATTORNEY'S DOCKET NO. 112740-151	
I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application(s) and the national or PCT International filing date of this application:					
PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS DESIGNATING THE U.S. FOR BENEFIT UNDER 35 U.S.C. 120:					
U.S. APPLICATIONS				STATUS (Check one)	
U.S. APPLICATION NUMBER	U.S. FILING DATE	PATENTED	PENDING	ABANDONED	
PCT APPLICATIONS DESIGNATING THE U.S.					
PCT APPLICATION NO	PCT FILING DATE	U.S. SERIAL NUMBERS ASSIGNED (if any)			
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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.					
SIGNATURE OF INVENTOR 201		SIGNATURE OF INVENTOR 202		SIGNATURE OF INVENTOR 203	
DATE 19 June 2001		DATE		DATE	